

Vision Sensing Ultrasonic Glove for Visually Impaired Person*

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Abstract— Significant percentage of the world population suffers from blindness or visual impairment. Due to lack of visual perception which feels as loss of independence. The basic factor behind blindness is that, there is a lacking of visual perception. And particularly for indoor and outdoor navigation has always been more challengeable to the blind people and also to the researchers. There are different type of mobility aids which were developed like guide dogs, long cane, walking stick, electronic robot. Somehow these electronic aids will help as raveling safety also in various types of walking lines and path. This research examines the new assistive technology which will give proper assistance to the blind people.

Keywords—obstacle avoidance; hand glove; blind people; ultrasonic sensor; buzzer

1. INTRODUCTION

Blindness is the one of the most common disabilities in the world. Vision is the most important sense of the human body. Because of the vision loss, lots of people suffer for in daily day to day life. There are so many things adopted for blind people [1,2]. A portable hand glove apparatus allowing blind people as increase in the flexibility and more convenience to adopt the device. Ultrasonic sensor have very high impact on distance measurement [3,4].AI based technology also adapted [5].Vision sensing ultrasonic glove also provides a cost effective way and the ckt having buzzer system make a simplest way to allow the path finding for visually impaired person. As by using ultrasonic sensor one can make a distance based interaction of near about 10 to 100 cm. if the obstacle is close then from the arduino controller a signal gives to the buzzer and there will be a alarm sound. Arduino has been used in different applications [6,7].So it is very easy to use, also very economic, cheap, easy to maintain and has low power consumption. The proposed approach is easy to adopt and helps in obstacle avoidance.

2. KEY FACTORS

2.1 Obstacle Parameters

As moving around on daily basis there are some key obstacles which needs to be avoided to ensure safe travelling. The activity and the mobility will be focused on improving navigation for the blind and increase the quality of life for visual impairment people.

It is easy to find the obstacles but there are different type of obstacles while moving around in a daily basis.

Table 1: Main Obstacles

<i>Area</i>	<i>Obstacles</i>
Head height	Branches of tree
Side obstacles	Narrowing path, scaffolding
Leg heights	Path curb stones, slopes and inclines

2.2 Barriers in Navigation

No doubt navigation is carried out through zebra crossing, familiar signs, artifacts while pavements and traffic lights while all are helping the individual to find his or her around.

There are difficulties like noise of traffic, traffic master's rules and traffic regulation associated with traffic light. The basic aim is that this research is for indoor environment. Indoor environment like homes, shopping centers, shared space. Basically in shopping centers consists of wide floor so that people can walk in both direction and there is no clear flow of children, also there are push chairs, shopping trolleys. Basically the ultrasonic glove can help in navigation in shopping complex.

Table 1: Main Barriers

<i>Barriers</i>	<i>Activity</i>
Personal care, environmental control	Daily living
Computer & internet access	Communication access
Access of environment navigation & obstacle avoidance	Mobility

3. PROPOSED CONCEPT OF HAND GLOVE

Ultrasonic hand glove is an essential for helping people those who are visual impaired to navigate different environment.

A combination of factors has an impact on our societies and a significant change has taken place by comparing to last decade. Increasing no of awareness and involvement makes the benefit to disabled people. Ultrasonic glove support decision making through the output results. Mainly it is related to three things, one being human person, second being activity and third assistive technology.

3.1 ASSISTIVE TECHNOLOGY

There are some assistive technologies which are very expensive. One big prominent issue about where the path may end. There are different wearable technology that has been investigated in different sectors and also by researchers, some types of assistive technology are biomedical and some are sensor based which are working with GPS [8].

3.2 Developments

- Particularly in biomedical field, Pixium Vision [9] and Argus II [10] are based on retina communication with the blind person
- Some sensor based glove design, some cases there is requirement of camera fittings and some cases the device has to mounted on the waist. Basically the sensors are used in particular assistive technology are IR sensor, Ultrasonic sensor, and sonar .

3.3 Design Implementations

Building a prototype is the real act of design thinking of different thought. To build an effective, designer must go through the early software simulation like proteus design suite. As by using this one can easily find the early fault before implementing the hardware connection. Improvement can be possible only when the designer have the full idea about the users involvement and also engaging with blind community. Here we are only using a single ultrasonic sensor for easy understand purpose, but one can use as per required specification.

Basically we are using arduino uno, HCSR04 ultrasonic sensor, buzzer, vibration motor, and battery as prototyping platform. 5v dc is supply to the VCC pin of sensor and from arduino the D11 pin trigger to the sensor. The sensor's detects data is send to D10 of arduino controller. Output pins D7, D8 sends output echo to the buzzer and motor. So that audible buzzer tone will be there. Working prototype is shown in figure 1 and the proteus simulation is shown in figure 2.

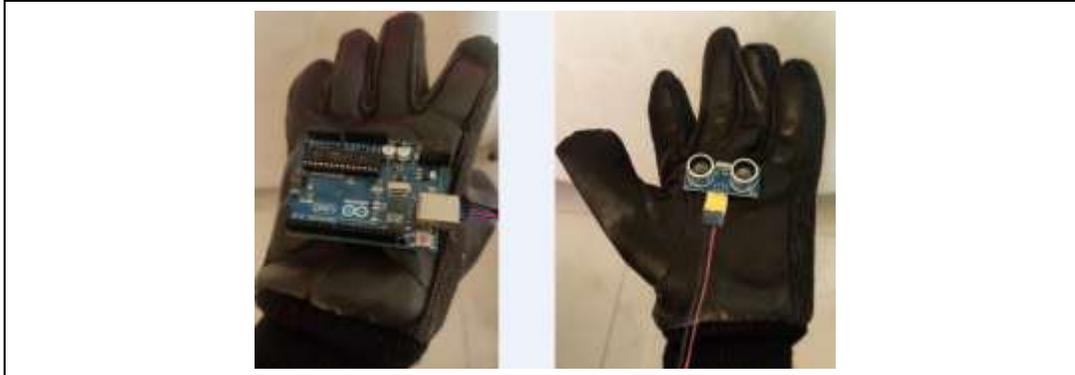


Fig. 1. Ultrasonic sensor in hand glove

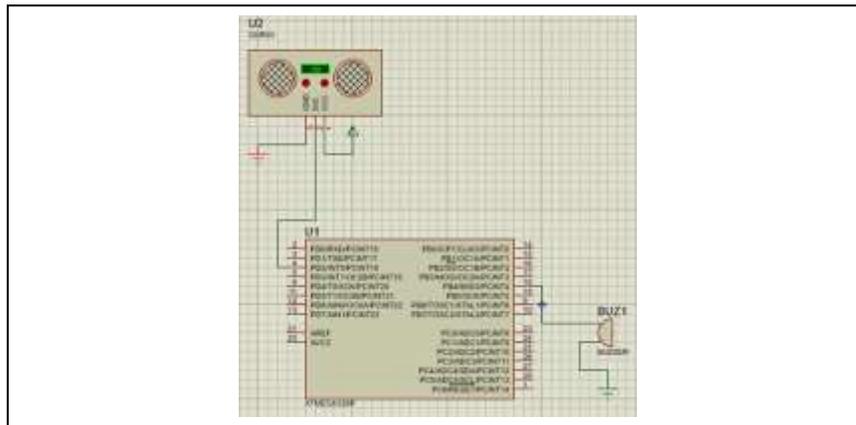


Fig. 2. Proteus simulation

3.4 Some Common Mistakes

- The circuit connection should be properly checked.
- The use of battery power should require to verify.

4. CONCLUSION

Positioning Ultrasonic glove can tackle all difficulties and is very suitable assistive technology for any environment. The ultrasonic glove which can be easily controlled by the blind person within some days of training , which will provide sufficient output to a blind as well as it also increase the confidence while walking through to partially sighted user or a blind person. It is also easy to wear and gives a warning if there is an upcoming obstacle. Audible buzzer sound information only can help in the assistive technology. Further research is to improve the transmission speed to the user about the information and some feedback system for the users can make some further improvement.

5. ACKNOWLEDGMENT

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